

PRESSURE VENT HURRICANE SHUTTER

CROSS REFERENCE TO RELATED APPLICATION

This is a continuation in part of application number 09/966,622 filed October 1, 2001, now abandoned.

BACKGROUND OF THE INVENTION

This invention relates to hurricane shutters and more particularly to a hurricane shutter that protects requisitely against storm-borne objects, wind and rain while also venting buildups and bursts of pressure and vacuum that react on buildings from hurricanes and other severe storms.

Devastation from severe hurricanes has resulted in storm-area legal requirements and personal interest in adequate storm protection that also is attractive, convenient and, if possible, low cost. Numerous storm-protective shutters have occurred as a result. None, however, help to deflect strong hurricane force winds while addition to providing requisite protection against storm-borne objects, wind and rain in a manner taught by this invention.

Examples of the most-closely related known but different devices are described in the following patent documents:

<u>Number</u>	<u>Inventor</u>	<u>File Date</u>	<u>Issue Date</u>	<u>Classification</u>
U.S. 6,536,174 B	Foster et al.	05/07/01	03/25/03	52/473
U.S. 3,039,155	Iacovoni	10/07/59	06/19/62	49/67
U.S. 5,737,874	Sipos et al.	12/15/94	04/14/98	49/67

U.S. 5,907,929	Poma et al.	11/21/97	06/01/99	49/62x
U.S. 5,617,683	Ney	03/25/96	04/08/97	52/202
U.S. 4,368,594	Milam et al.	02/12/81	01/18/83	49/67
U.S. 2,013,824	Ensminger		09/35	160/77
U.S. 1,646,522	Berg		10/27	49/356
U.S. 2,716,785	Schoen	10/21/53	09/06/55	49/67
U.S. 3,667,161	Sassano	10/16/70	06/06/72	49/56
U.S. 3,691,687	Economou	08/06/71	09/19/72	49/74

The Foster et al., Iacovoni, and Sipos et al. shutters do not provide weld guides to keep shutters from turning in during hurricane forces as taught by this invention. The Poma et al. shutter requires a removable rigid support for requisite protection. Shutters described by Ney, Milan et al., Ensminger, Berg and Schoen do not have pressure venting as taught by this invention. The Sassano patent does not disclose shutters, but rather a shutter operating mechanism. The Economou shutter teaches slidable slats not requiring weld guides for support.

SUMMARY OF THE INVENTION

Objects of patentable novelty and utility taught by this invention are to provide a pressure-vent hurricane shutter which:

vents damaging buildups and bursts of pressure and vacuum that react on buildings from hurricanes;

provides legally requisite protection against storm-borne objects, wind and rain;

can be made attractive in a variety of structural styles; and
can be cost-effective for the level of protection provided.

This invention accomplishes these and other objectives with a pressure-vent hurricane shutter having preferably at least legally-requisite strength of
5 framework encompassing slatted-louver apertures for protection against storm-borne objects, wind and rain in addition to venting damaging buildups and bursts of pressure and vacuum that react on buildings from hurricanes. The framework includes structural beams to which ends of slanted slats are attached rigidly and to which inward edges of the slanted slats are attached to the inward edge of the
10 slat-support guide cover and the outward edges of the slanted slats are attached to the front wall of the slat-support guide. The framework is hinged with the requisite strength to at least one side of a building aperture in accordance with desired shutter style and structure which include top-hinged Bahama and sides-hinged Colonial styles.

BRIEF DESCRIPTION OF DRAWINGS

This invention is described by appended claims in relation to description of a preferred embodiment with reference to the following drawings which are explained briefly as follows:

FIG. 1 is a partially cutaway front elevation view of a Bahama-Shutter embodiment;

FIG. 2 is a is a section view through section line 2-2 of **FIG. 1**;

FIG. 3 is a is a section view through section line 3-3 of **FIG. 1**;

5 **FIG. 4** is an end view of a framework member;

FIG. 5 is an end view of a slat-support guide;

FIG. 6 is a partially cutaway side elevation view of a Bahama-Shutter embodiment mounted on a building structure and being in an open mode;

FIG. 7 is the **FIG. 6** illustration in a closed mode;

10 **FIG. 8** is a front elevation view of a colonial-shutter embodiment having double-louver sections for average-sized doors and windows in a closed mode;

FIG. 9 is a fragmentary view of a colonial-shutter hinge shown hinging two portions of the Colonial Shutter together;

15 **FIG. 10** is a fragmentary end view of a preferred shutter hinge that can be used either horizontally for hang-hinging Bahama Shutters or vertically for swing-hinging Colonial Shutters;

FIG. 11 is an end view of a single shutter hinge that is shown in the **FIG. 10** illustration;

20 **FIG. 12** is an end view of a flat shutter hinge that is shown in the **FIG. 10** illustration;

FIG. 13 is a top view of the single shutter hinge that is shown in the **FIG. 10** illustration;

FIG. 14 is a top view of the flat shutter hinge that is shown in the **FIG. 10** illustration;

FIG. 15 is a fragmentary side view of the preferred shutter hinge in which the single hinge is shown attached to a metallic or other rigid form as seen from a left side of the **FIG. 10** illustration and the flat hinge is shown from a bottom of the **FIG. 10** illustration;

FIG. 16 is a fragmentary side view of the preferred shutter hinge in which the single hinge is shown attached to the build-out frame which is attached to the building structure from a top side of the **FIG. 10** illustration and the flat hinge is shown from the bottom of the **FIG. 10** illustration;

FIG. 17 is a perspective view of a flat shutter hinge with ribs;

FIG. 18 is a side view of a flat shutter hinge with ribs;

FIG. 19 is a section view through section line 19-19 of **FIG. 1**;

FIG. 20 is an end view of a mullion slat-support guide assembly;

FIG. 21 is a side view of a left slat-support guide;

FIG. 22 is a side view of a right slat-support guide;

FIG. 23 is a perspective view of a left slat-support guide;

FIG. 24 is a perspective view of a right slat-support guide;

FIG. 25 is a front view of a slat-support guide;

FIG. 26 is a section view through section line 26-26 of **FIG. 25**; and

FIG. 27 is a front view of a hold down tab.

DESCRIPTION OF PREFERRED EMBODIMENT

Listed numerically below with reference to the drawings are terms used to describe features of this invention. These terms and numbers assigned to them designate the same features throughout this description.

- | | |
|--------------------------------|---------------------------------------|
| 1. shutter framework | 17. flat hinge |
| 2. face walls | 18. hinge pin |
| 3. edge walls | 19. rib |
| 4. shutter spacer | 20. inward edge of slat |
| 5. slanted slats | 21. outward edges of guide |
| 6. right slat-support guide | 22. side wall of slat-support guide |
| 7. left slat-support guide | 23. front wall of slat-support guide |
| 8. mullion slat-support guide | 24. inward side of slat-support cover |
| 9. slat-support cover | 25. outward edge of slat |
| 10. mullion slat-support cover | 26. window opening |
| 11. build out framework | 27. hold open rod |
| 12. hold down tab | 28. slot |
| 13. shutter hinge assembly | 29. bahama shutter |
| 14. flat hinge assembly | 30. colonial shutter |
| 15. building structure | 31. slatted-louver aperture |
| 16. single hinge | 32. hole |

Referring to **FIGS. 1-5**, a pressure-vent hurricane shutter has at least one shutter framework **1** that includes structural beams that preferably are structural metal tubes having face walls **2** that are about one to two inches wide and edge walls **3** that are one-and-one half inches wide. The face walls **2** and the edge walls **3** are about one-eighth inch thick and made preferably of structural

aluminum alloy 6063-T52 or a substantial equivalent.

The substantial equivalent can be a ferrous alloy that is preferably stainless and rustproof with either an adequate coating or content of nickel, chrome, aluminum or other stainless constituent.

5 The shutter framework **1** encompasses slatted-louver apertures **31** having slanted slats **5** with slat ends affixed to the shutter framework **1**. The slanted slats **5** have inward edges **20** and outward edges **25** that are oriented horizontally and attached to the right slat-support guide **6**, the left slat-support guide **7**, and the slat-support cover **9**. The slat-support guides **6** and **7** are oriented vertically
10 with ends attached to horizontal portions of the shutter framework **1**. Both the inward edges of the slats **20** and the outward edges of the slats **25** are orthogonal to the slat-support guides **6** and **7**. The inward edges of the slats **20** are attached to the inward side of the slat-support cover **24**. The outward edges of the slats **25** are attached to the front wall of the slat-support guide **23**. The slats **5** feed into
15 the slots **28** located on the side walls of the slat-support guide **22**.

 The shutter framework **1** also encompasses hold down tabs **12** located on the horizontal portions of the shutter framework **1**. The hold down tabs **12** on Bahama Shutters **29** are located on the bottom horizontal shutter framework **1**. The hold down tabs **12** on Colonial Shutters **30** are located on the top and bottom
20 horizontal shutter framework **1**. A quarter-inch screw is inserted through the

hold down tab 12 into build out framework 11 correspondingly mounted onto the building structure 15. The hold down tabs 12 hold the shutter framework 1 to the build out framework 11 to keep the shutter framework 1 from blowing open during a storm. Flat hinges 17 with ribs 19 are located on the shutter framework 1 to keep the shutter framework 1 from hitting the single hinge 16, thus preventing paint from rubbing off of the single hinge 16.

The slatted-louver apertures 31 includes an entire slatted enclosure of a plurality of apertures between the slanted slats 5 and the shutter framework 1. The plurality of apertures individually are slanted with preferably about one-half inch of distance of slant orthogonally between surfaces of the slanted slats 5. The slanted slats 5 are preferably flat aluminum bar stock about one-quarter inch thick and one inch wide. Between bottoms and tops of adjacent slanted slats 5, there are horizontal apertures about one-eighth inch high and having a length that is a length of the slanted slats 5, less a width of the slat-support guides 6 and 7. The slat-support guides 6 and 7 have a side wall 22, a front wall 23, and a back slat-support cover 9. The slat-support guides 6 and 7 are attached to the inward edges of the slats 20 as well as the outward edges of slats 25 to keep the slanted slats 5 from turning in and maintaining proper separation and angle when under pressure from high winds and wind borne objects. The slat-support guides 6 and 7 and the mullion slat support cover 10 have the appearance of a

rectangular mullion so as to give a more aesthetic appearance.

A pressure-vent object of this hurricane shutter is to allow predeterminedly slight passage of wind and rain horizontally straight through slatted-louver apertures of the shutter framework 1 and slightly more directional-change passage while also providing structural strength to prevent breakage by storm-borne objects, wind and rain of hurricanes. Allowing directional-change passage of hurricane-force wind and rain while stopping large storm-borne objects and directional-change diversion of small objects like gravel and small debris eliminates directly damaging aspects of hurricanes.

Included on fronts of slatted-louver apertures 31 of Bahama Shutters 29 shown in FIGS. 1-7 and Colonial Shutters 30 shown in FIGS. 8-10 are portions of the slat-support guides 6 and 7 that are straight through horizontally between bottoms and tops of vertically adjacent slanted slats 5. Also shown are portions of a mullion slat-support guide 8 that are slanted between the slanted slats 5 that are juxtaposed vertically.

Referring to FIGS. 6-7, the shutter framework 1 is sized, shaped and designed predeterminedly for a Bahama Shutter 29 having a shutter hinge assembly 13 mounted on top of the shutter framework 1 with which it is hinged to the shutter framework 1 and build out framework 11 on a building structure 15. The top mount shutter hinge assembly 13 is representative of a selection of

Bahama Shutter hinges having appropriate strength and operativeness for legal and other predetermined requisites for hinging hurricane shutters to building apertures.

Referring to **FIG. 8**, the shutter framework **1** is sized, shaped and designed predeterminedly for a Colonial Shutter **30** having a mount shutter hinge assembly **13** mounted on the side of the shutter framework **1** and build out framework **11** on a building structure **15**. The structural member includes a Colonial build out frame **15** on the building. The Colonial Shutter **30** includes a flat hinge assembly **14** with which pluralities of the shutter frameworks **1** are hinged together for side-folding.

The build out framework **11** is shown in **FIG. 8**. The building apertures in the buildings are not shown separately from structural members which include the build out framework **11** in **FIG. 8**.

Referring to **FIG. 9**, the flat hinge assembly **14** can include a selection of aluminum hinges and other frame-fold hinges which can be positioned in accordance with folding characteristics of Colonial Shutters. Flat hinge assembly **14** in this illustration are shown on back sides of the shutter framework **1** with the slanted slats **5** and the slat-support guides **6** and **7** being seen in front of the slanted slats **5**.

Referring to **FIG. 10**, the shutter hinge assembly **13** is a preferred hinge

that can be used either horizontally for hang-hinging Bahama Shutters **29** or vertically for swing-hinging Colonial Shutters **30**. The flat hinges **17** have ribs **19** to keep the shutter framework **1** from hitting the single hinge **16**, thus preventing paint from rubbing off of the single hinge **16**. For the Colonial Shutters **30**, the shutter hinge assembly **13** can be swing-hinged and include a fold-back mode with single hinge **16** attached to the build out framework **11** and with a flat hinge **17** attached to the shutter framework **1** and joined by a shutter-hinge pin **18** as depicted in **FIG. 17**.

As shown in **FIGS. 6-7** and **16** for the Bahama Shutters **29**, the flat hinge **17** with ribs **19** can be hang-hinged and include a hanging mode with single hinge **16** attached to the build out framework **11**, with which is attached to the building structure **15**. The flat hinges **17** are attached to the shutter framework **1** and joined by a hinge pin **18** as depicted in **FIG. 16**. The hold down tabs **12** are located on the horizontal portion of the shutter framework **1**. A one-quarter inch screw is inserted through the hold down tab **12** into the build out framework **11** correspondingly mounted onto the building structure **15**. The hold down tabs **12** hold the shutter framework **1** to the build out framework **11**, helping to keep the shutter framework **1** from blowing open during a storm.

Referring to **FIGS. 17** and **18**, the flat hinge **17** is shown with ribs **19** in detail.

Referring to **FIG. 19**, a cross-section of slanted slat **5** is shown affixed to slat-support guides **6** and **7**. The slat-support guides **6** and **7** and the ends of the slanted slats **5** in turn, are affixed to the shutter framework **1**. The slat-support cover **9** is affixed to the back of the slat-support guides **6** and **7** and to the edge walls **3** of the shutter framework **1**.

Referring to **FIG. 20**, the end view of a mullion slat-support guide **8** is shown. The mullion slat-support guide **8** consists of one right slat-support guide **6**, one left slat-support guide **7**, one mullion slat-support cover **10** affixed to form a rectangular cross-section.

Referring to **FIG. 21**, a side view of a left slat-support guide **7** is shown without the slanted slats **5**. The side wall **22** has slots **28** where the slanted slats **5** feed into. A slat-support cover **9** would be affixed to the inward edge of slats **20** once placed into the slots **28**.

Referring to **FIG. 22**, a side view of a right slat-support guide **6** is shown without the slanted slats **5**. The side wall **22** has slots **28** where the slanted slats **5** feed into.

Referring to **FIG. 23**, a perspective view of a left slat-support guide **7** is shown by itself with slots **28** on the side wall **22**.

Referring to **FIG. 24**, a perspective view of a right slat-support guide **6** is shown by itself with slots **28** on the side wall **22**.

Referring to **FIG. 25**, a front view of a mullion slat-support guide **8** is shown.

Referring to **FIG. 26**, a cross-section of a right slat-support guide **6** is shown. The inward edges **20** of the slanted slats **5** are affixed to the slat-support cover **9**.

Referring to **FIG. 27**, a front view of a hold down tab **12** with a hole **32** is shown.

The single hinge **16** and the flat hinge **17** of the shutter hinge assembly **13** and flat hinge assembly **14** are made preferably of structural aluminum alloy 6063-T5, 6061-T6 or a substantial equivalent. As for other metallic components, the substantial equivalent can be a ferrous alloy that is preferably stainless and rustproof with either an adequate coating or having suitably alloyed content of nickel, chrome, aluminum and/or other stainless constituent.

A new and useful pressure-vent hurricane shutter having been described, all such foreseeable modifications, adaptations, substitutions of equivalents, mathematical possibilities of combinations of parts, pluralities of parts, applications and forms thereof as described by the following claims and not precluded by prior art are included in this invention.